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GGSIPU Mathmatics 2004

1. If the angles between the pair of straight lines represented by the equation $X^2 - 3xy + {}^a y^2 + 3x - 5y + 2 = 0$ is $\tan^{-1}\frac{1}{3}$.

Where' ^{a}' is a non-negative real number,then ^{a} is :

(a) 2 (b) 0

(c) 3 (d) 1

2. The distance of the line 2x-3y = 4 from the point (1,1) measured parallel to the line x+y = 1 is :

(a) $\sqrt{2}$ (b) $5/\sqrt{2}$

(c) $1/\sqrt{2}$ (d) 6

3. The equations of bisectors of the angles between the lines $^0x^0 = {}^0y^0$ are :

(a) y= ±x and x=0

(b) x=$\frac{1}{2}$ and y = $\frac{1}{2}$

(c) y =0 and x =0

(d) none of these

4. The base of vertices of an isosceles triangle PQR are Q (1,3) and R (-2,7).The vertex p can be :

(a) (1,6) (b) ($\frac{1}{2}$, 5)

(c) ($\frac{5}{6}$, 6) (d) none of these

5. The normal at the point (3,4) on a circle cuts the circle at the point (-1,-2).Then the equation of the circle is :

(a) $x^2 + y^2 + 2x - 2y - 13 = 0$

(b) $x^2 + y^2 - 2x - 2y - 11 = 0$

(c) $x^2 + y^2 - 2x + 2y + 12 = 0$

(d) $x^2 + y^2 - 2x - 2y + 14 = 0$

6. If cos P = $\frac{1}{7}$ and cos Q = $\frac{13}{14}$ where 'P' and 'Q' both are acute angles. Then the value of P-Q is :

(a) 30^0 (b) 60^0

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(c) 45^0 (d) 75^0

7. The equation 3 cos x + 4 sin x = 6 has …….. solution

(a) finite (b) infinite

(c) one (d) no

8. If $\sec^{-1} x = \text{cosec}^{-1} y$, then $\cos^{-1}\frac{1}{x} + \cos^{-1}\frac{1}{y}$ is equal to :

(a) ® (b) ®/4

(c) - ®/2 (d) ®/2

9. If 'n' be any integer ,then n(n+1) (2n+1) is :

(a) odd number (b) integral multiple of 6

(c) perfect square (d) does not necessarily have any of the foregoing proof

10. If tan ¯ = $-\frac{4}{3}$, than the value of sin ¯ is :

(a) $-\frac{4}{5}$ but $\div\frac{4}{5}$ (b) $-\frac{4}{5}$ or $\frac{4}{5}$

(c) $\frac{4}{5}$ but $\div -\frac{4}{5}$ (d) $\frac{1}{5}$

11. If c = 2 cos ¯, then the value of the determinant $\Delta = \begin{vmatrix} c & 1 & 0 \\ 1 & c & 1 \\ 6 & 1 & c \end{vmatrix}$ is :

(a) $\frac{\sin 4\theta}{\sin\theta}$ (b) $\frac{2\sin^2 2\bar{}}{\sin\ell}$

(c) $4\cos^{2\bar{}}(2\cos\bar{} - 1)$ (d) none of these

12. the set of values of x for which the inequality ^{0}x-1^0 + ^{0}x+1^0 < 4 always holds true is :

(a) (-2,2) (b) (- ã,2) Ć (2, ã)

(c) (-ã,1] Ć [1,ã) (d) none of these.

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13. The equation of the parabola whose vertex is (-1,-2), axis is vertical and which passes through the point (3,6),is :

(a) $x^2 + 2x - 2y - 3 = 0$

(b) $2x^2 = 3y$

(c) $x^2-2x+2y-3 = 0$

(d) $x^2-2x-2y-3 = 0$

14. The length of the axis of the conic $9x^2+4y^2-6x+4y+1 = 0$ are :

(a) $\frac{1}{2}, 9$ (b) $3, \frac{2}{5}$

(c) $1, \frac{2}{3}$ (d) 3,2

15. If $f(x) = \cot^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$ and $g(x) = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, then $\lim_{x\to a}\frac{f(x)-f(a)}{g(x)-g(a)}$, $0<a<\frac{1}{2}$, is :

(a) $\frac{3}{2(1+a^2)}$ (b) $\frac{3}{2(1+x^2)}$

(c) $\frac{3}{2}$ (d) $-\frac{3}{2}$

16. If $f(x) = \begin{cases} x, & 0 \le x \le 1 \\ 2x - 1, & 1 < x \end{cases}$ then :

(a) f is discontinuous at x = 1

(b) f is differentiable at x = 1

(c) f is continuous but not differentiable at x = 1

(d) none of these

17. $\lim_{x\to -2}\frac{\sin^{-1}(x+2)}{x^2+2x}$ is equal to :

(a) 0 (b) ã

(c) $-\frac{1}{2}$ (d) none of these

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18. Let $f(x) = x^p \cos\left(\frac{1}{x}\right)$, when $x \div 0$ and $f(x) = 0$, when $x = 0$. then $f(x)$ will be differentiable at $x = 0$, if :

(a) $p > 0$ (b) $p > 1$

(c) $0 < p < 1$ (d) $\frac{1}{2} < p < 1$

19. The derivative of $f(x) = 3^0 2 + x^0$ atv the point $x_0 = -3$ is :

(a) 3 (b) -3

(c) 0 (d) none of these

20. Derivative of the function $f(x) = \log 5 (\log 7x)$, $x>7$ is :

(a) $\frac{1}{x(\log 5)(log7)(\log_7 x)}$

(b) $\frac{1}{x(\log 5)(log7)}$

(c) $\frac{1}{x(\log x)}$

(d) none of these

21. If $z = x+iy$, $z^{1/3} = a - ib$, then $\frac{x}{a} - \frac{y}{b} = k(a^2 - b^2)$, where k is equal to :

(a) 1 (b) 2

(c) 3 (d) 4

22. The number of real solutions of the equation $1+^0e^x - 1^0 = e^x(e^x - 2)$ is :

(a) 1 (b) 2

(c) 4 (d) 8

23. The points of extrema of $f(x) = \int_0^x \frac{\sin t}{t}$ dt in a domain $x>0$ are :

(a) $(2n+1)\frac{\pi}{2}$, n = 1,2,.....

(b) $(4n+1)\frac{\pi}{2}$, n = 1,2,.....

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(c) (2n+1) $\frac{\pi}{4}$, n = 1,2,.....

(d) n ®,n =1,2,.....

24. If i=x^2 + y^2 and x=s+3t,y=2s-t,then $\frac{d^e u}{ds^2}$ is equal to :

(a) 12 (b) 10

(c) 32 (d) 36

25. If the equation x^2+qx+p = 0 have a common root then p+q+1 is equal to :

(a) 0 (b) 1

(c) 2 (d) -1

26. The value of a(a≥b) for which the sum of the cubes of the roots of x^2- (a-2) x+ (a-3) =0 assumes the last value is :

(a) 3 (b) 4

(c) 5 (d) none of these

27. Let z_1,z_2,z_3 be three vertices of an equilateral triangle circumscribing the circle $^0z^0 = \frac{1}{2}$. If $z_1 = \frac{1}{2} + \frac{i\sqrt{3}}{2}$ and z_1,z_2,z_3 were in anticlockwise sense,then z_2 is :

(a) 1+ $\sqrt{3i}$ (b)) 1- $\sqrt{3i}$

(c) 1 (d) -1

28. If z=$\frac{-2}{1+\sqrt{3i}}$, then the value of arg (z) is :

(a) ® (b) ®/3

(c) 2®/3 (d) ®/4

29. Let μ is an imaginary cube roots of unity ,then the value of

2(1+μ) (1+$μ^2$) + 3 (2μ+1) (2$μ^2$+1) + ...+ (n+1) (nμ+1) (n$μ^2$ + 1) is :

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(a) $\left[\frac{n(n+1)}{2}\right]^2 + n$ (b) $\left[\frac{n^2(n+1)^2}{4}\right]$

(c) $\left[\frac{n(n+1)}{2}\right]^2 - n$ (d) none of these

30. The locus of the point z satisfying arg $\left[\frac{z-1}{z+1}\right]$= k,(where k is non zero) is :

(a) a circle with centre on y-axis

(b) circle with centre on x-axis

(c) a straight line parallel to x- axis

(d) a straight line making an angle 60^0 with the x-axis

31. If (3,4,5),Q(4,6,3),R(-1,2,4),s(1,0,5),then the projection of RS on PQ is :

(a) -2/3 (b) -4/3

(c) ½ (d) 2

32. If a line makes ~, ,¥ with the positive direction of x,y,z-axes respectively.Then $\cos^2$~+$\cos^2$ +$\cos^2$¥ is equal to :

(a) ½ (b) -1/2

(c) -1 (d) 1

33. The projection of a line on co-ordinate axes are 2,3,6.Then the length of the line is :

(a) 7 (b) 5

(c) 1 (d) 11

34. The decimal equivalent of the binary number 10011.1 is :

(a) 19.50 (b) 11001.11

(c) 5005.55

(d) 19.10

35. The binary represents of 60 is :

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(a) 101110 (b) 111100

(c) 110011 (d) 110000

36. Which of the following statement is not tautology ?

(a) ¼(p □ q) □ p

(b) (p □ q) □ p

(c) q □ ¼ (p □ q)

(d) (¼p □ q)ą(¼p □ p)

37. The period of f(x) = $\sin\left(\frac{rx}{n-1}\right) + \cos\left(\frac{rx}{n}\right)$, n Č z,n>2 is :

(a) 2rn (n-1)

(b) 4n(n-1)

(c) 2n(n-1)

(d) none of these

39. The radius of the circle whose arc of length 15 km makes an angle of $\frac{3}{4}$ radian at the centre ,is :

(a) 10 cm

(b) 20 cm

(c) $11\frac{1}{4}$ cm

(d) $22\frac{1}{2}$ cm

40. If $f_n(x) = e^{f(n-1^{(x)}}$,for all n Č N and $f_0(x) = x$,then $\frac{d}{dx}\{f_n(x)\}$ is equal to :

(a) $f_n(x)\, f_{n-1}(x)$

(b) $f_n(x)\, \frac{d}{dx}\{f_{n+1}\, 9x)\}$

(c) $f_n(x)\, f_{n-1}(x)$

....$f_2(x)\, f_1(x)$ (d) none of these

41. if $3^x + 2^{2x}$ ñ 5^x , then the solution set for x is :

(a) (- ã,2]

(b) [2,ã)

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(c) [0,2]

(d) {2}

42. The number of integral solution of $\frac{x+1}{x^2+2} > \frac{1}{4}$ is :

(a) 1

(b) 2

(c) 5

(d) none of these

43. The value of k for which the equation (k-2) x^2 + 8x + k +4 = 0 has both real,distinct and –ve,is :

(a) 0

(b) 2

(c) 3

(d) -4

44. The triangle PQR of which the angles P,Q,R satisfy cos P = $\frac{\sin Q}{2 \sin R \, is}$:

(a) equilateral

(b) right angled

(c) any triangle

(d) isosceles

45. If f(x) = $(a-x^n)^{1/n}$, where a>0 and n is a positive integer , then f[f (x)] is equal to :

(a) x^3

(b) x^2

(c) x

(d) none of tese

46. The function f(x) = $[x]^2 - [x^2]$ (where [y] is the gretest integer less then or equal to y) is discontinuous at :

(a) all integers

(b) all integers except 0 and 1

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(c) all integers except 0

(d) all integers except 1

47. the function f(x) = ^{0} px-q ^{0} + r ^{0} x ^{0}, x Č (-ã,ã) where p>0,q.0,r>0 assumes its maximum value only at one point,if :

(a) p÷q (b) q÷r

(c) r÷p (d) p=q=r

48. A function f(x) = $\frac{x^2-3x+2}{x^2+2x-3}$ is :

(a) maximum at x= -3

(b) maximum at x= -3 and maximum at x= 1

(c) maximum at x= 1

(d) function is increasing in its domain

49. The locus of the point p(x,y) satisfying the relation

$\sqrt{(x-3)^2 + (y-1)^2} + \sqrt{(x+3)^2 + (y-1)^2} = 6$ is

(a) Straight line
(b) Pair of straight lines
(c) Circle
(d) Ellipse

50. If z_1 , z_2 and z_3 are complex number such that ^{0} z_1 ^{0} = ^{0} z_2 ^{0} = ^{0} z_3 ^{0} = $\frac{1}{z_1}+\frac{1}{z_2}+\frac{1}{z_3}$ = 1 then ^{0} z_1 + z_2 + z_3 ^{0} is :

(a) equal to 1

(b) less than 1

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(c) greater than 3

(d) equal to 3

51. Let a_1, a_2, a_3 be any positive real numbers , then which of the following statement is not true ?

(a) $3a_1a_2a_3$ á $a_1^3 + a_2^3 + a^3_3$

(b) $\frac{a_1}{a_2} + \frac{a_2}{a_3} + \frac{a_3}{a_1}$ ñ 3

(c) ($a_1a_2a_3$)

$\left(\frac{1}{a_1} + \frac{1}{a_2} + \frac{1}{a_3}\right) \geq 9$

(d) ($a_1a_2a_3$)

$\left(\frac{1}{a_1} + \frac{1}{a_2} + \frac{1}{a_3}\right)^3 \leq 27$

52. If ab = 2a +3b,a>0,b<0,then the minimum value of ab is :

(a) 12

(b) 24

(c) $\frac{1}{4}$

(d) none of these

53. Let N be +ve integer ÷ 1, then none of the numbers 2,3,…,N is divisor of (N ! -1).So we can conclude that (N! -1) is :

(a) prime number

(b) at least one of this number (N+1), (N+2),….,(N ! – 2) is divisor of (N! – 1)

(c) The smallest numbers between N and N ! which is divisor of (N ! -1) is prime number

(d) none of these

54 . If f(x) = cos [$®^2$] x+cos [- $®^2$] x,then :

(a) f (®/4)=2

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(b) f (-®)=2
(c) f (®) = 1
(d) f (®/2)=-1

55. let f(x) = $\frac{x^2-4}{x^2+4}$, for $^0x^0$ > 2,then the function f : (- ã,-2] Ć [2,ã) → (-1,1) is :

(a) one-one into (b) one-one onto

(c) many-one into (d) many-one onto

56. The function f(x) = sin (log (x+ $\sqrt{x^2+1}$)) is :

(a) even function (b) odd function

(b) neither even nor odd (d) periodic function

57. The range of f(x) = sec$\left(\frac{\pi}{4}\ cos^2 x\right)$, - ∝ < x < ã is :

(a) [1,$\sqrt{2}$]

(b) [1,ã)

(c) [- $\sqrt{2}$,-1] Ć [1,$\sqrt{2}$] (d) (- ã,1] Ć [1,ã)

58. For any three sets A_1 ,A_2,A_3.Let B_1 = A_1,B_2 = A_2-A_1 and B_3 = A_3 – (A_1 Ć A_2),then which of the following statement is always true ?

(a) A_1 Ć A_2 Ć A_3 ć B_1 Ć B_2 Ć B_3

(b) A_1 Ć A_2 Ć A_3 = B_1 Ć B_2 Ć B_3

(c) A_1 Ć A_2 Ć A_3 Ċ B_1 Ć B_2 Ć B_3

(d) none of these

59. the domain of the function f(x) = $\frac{sin^{-1}(3-x)}{\log(\sqrt{x}-2)}$ is :

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(a) [2,4]

(b) (3,4]

(c) [2,ã)

(d) (- ã,3) Ć [2,ã)

60. The remainder obtained when 1! + 2! + …. + 200! Is divided by 14 is :

(a) 3

(b 4

(c) 5

(d) none of these

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